

# PATENT COOPERATION TREATY

*SP*

*30.11.2001 = 28 Monate*  
*30.12.2001 = 29 Monate*  
**PCT**

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:	
DR. WEITZEL & PARTNER Friedenstrasse 10 D-89522 Heidenheim ALLEMAGNE	
<b>Eingang</b> Dr. Weitzel & Partner 15. Okt. 2001	
RL: .....	VT: .....
Endtermin: .....	

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT  
(PCT Rule 71.1)

Applicant's or agent's file reference P 15349WO		<b>IMPORTANT NOTIFICATION</b>	
International application No. PCT/EP00/07258	International filing date (day/month/year) 28/07/2000	Priority date (day/month/year) 30/07/1999	Date of mailing (day/month/year) 11.10.2001
Applicant CARL ZEISS			


1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

#### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/		Authorized officer	
 European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Cardenas, C  Tel.+31 70 340-3370	



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 15349WO		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP00/07258	International filing date (day/month/year) 28/07/2000	Priority date (day/month/year) 30/07/1999	
International Patent Classification (IPC) or national classification and IPC G03F7/00			
Applicant CARL ZEISS			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  12/01/2001	Date of completion of this report  11.10.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  Heryet, C  Telephone No. +31 70 340 2716 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/07258

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-41 as originally filed

**Claims, No.:**

1-32 as received on 12/07/2001 with letter of 09/07/2001

**Drawings, sheets:**

1/26-26/26 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/07258

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.  
☒ paid additional fees.  
☐ paid additional fees under protest.  
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.  
☒ not complied with for the following reasons:  
**see separate sheet**

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.  
☐ the parts relating to claims Nos. .

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-32
	No: Claims
Inventive step (IS)	Yes: Claims 1-32
	No: Claims

# **INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

International application No. PCT/EP00/07258

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Industrial applicability (IA)    Yes:    Claims    1-32  
   No:    Claims

2. Citations and explanations  
**see separate sheet**

## **VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

## **VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/07258

**Prior art**

Reference is made to the following documents:

D1	US 4 572 659 A
D2	US 5 677 939 A
D3	US 5 581 605 A

**Item IV: Lack of unity of invention**

The claims do not appear to be unitary in the sense of Rules 13.1, 13.2 PCT.

The claims of the **first group of claims** identified in Item V all comprise technical features, which define a contribution over D1 involving the formation of an arc-shaped image field with a predetermined edge sharpness. These features may therefore be considered as special technical features in the sense of Rule 13.2 PCT.

The claims of the **second group of claims** identified in Item V all comprise technical features, which define a contribution over D2 involving a field forming component comprising a mirror. These features may therefore be considered as special technical features in the sense of Rule 13.2 PCT.

Since the special technical features of the first group of claims are not the same as and do not correspond to the special technical features of the second group of claims, the first and second groups of claims cannot be considered as unitary in the sense of Rule 13.1, 13.2 PCT.

**Item V: Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**First group of claims**

**D1** discloses (column 2, line 18 - column 3, line 3; column 3, line 57 - column 4, line 23; figures 1-6, 9) the following non-optional features of **claim 1**, namely a:

*Multi-mirror system for an illumination system with wavelengths  $\leq 193$  nm*

*comprising an imaging system, wherein said imaging system (12, 13) comprises a first mirror (12) and a second mirror (13);*

*an object plane (between blades 18A, 18B)*

*an image plane (K), wherein the imaging system (12, 13) forms an image of the object (18A, 18B)*

*an arc-shaped field (cf. column 2, lines 56-58) in said image plane (K), whereby the radial direction in the middle of the arc-shaped field defines a scanning direction*

*at least said first mirror (12) and said second mirror (13) of said imaging system (12, 13) are arranged in the optical path of the imaging system (12, 13) in such a position and having such a shape (cf. column 3, line 57 - column 4, line 23; figure 9), that the edge sharpness of the arc-shaped field in the image is smaller than 5mm in the scanning direction (cf. column 2, line 62 - column 3, line 3; figures 5, 6; bearing in mind that the width of the arc-shaped illumination field would typically be a few millimetres), whereby the edge sharpness is defined as the difference of the greatest value and the smallest value in scanning direction of points of a spot diagram in the image plane for an edge field point of the arc-shaped-field*

*the rays travelling from the object plane (between blades 18A, 18B) to the image plane (K) in the imaging system are impinging the first (12) and the second mirror (13) defining a first and a second used area on the mirrors.*

The **difference** between the claim 1 and D1 is that:

*the rays are impinging the first (12) and the second mirror (13) in the used area with an incidence angle relative to the surface normal of the mirror  $\leq 30^\circ$  or  $\geq 60^\circ$ .*

This difference solves the **objective problem** of providing a multi-mirror system which is arranged to produce an arc-shaped image field with sharp edges as in D1, but which is usable at wavelengths requiring multilayer dielectric mirrors which do not work satisfactorily at  $45^\circ$  incidence.

None of the available **prior art** documents discloses this difference. D2 (column 22, line 10 - column 26, line 29; figures 5, 6, 11-14, 21) discloses an evf multi-mirror system which is arranged to produce an arc-shaped image field without an imaging system according to claim 1.

Therefore, claim 1 appears to be novel and inventive in the sense of Article 33 PCT.

The same applies to apparatus **claims 2-15, 27, 28**, because they depend on claim 1, and to apparatus **claims 30, 31**, insofar as they depend on claim 1.

The argument in favour of claim 1 applies *mutatis mutandis* to independent method **claim 32** insofar as it corresponds to independent apparatus claim 1.



**Second group of claims**

**D2** discloses (column 22, line 10 - column 26, line 29; figures 5, 6, 11-14, 21) the following features of **claim 16**:

*Multi-mirror system (82, 4a, 4b, 3) for an illumination system for lithography with wavelengths  $\leq 193\text{nm}$ , cf. column 25, lines 62-67*

*comprising an imaging system (paraboloidal mirror 82, and concave cylindrical reflection type optical integrator 4a forming secondary line sources), wherein said imaging system (82, 4a) comprises*

*an object plane (containing X-ray source 81, cf. figure 13)*

*an image plane (containing secondary line sources, cf. figures 13, 14A), wherein the imaging system (82, 4a) forms an image of the object (81 - because an anamorphic image is an image),*

The **difference** between claim 16 and D2 is that:

*said imaging system comprises at least a normal incidence mirror and a field forming optical component for producing an arc-shaped field in said image plane, whereby said field forming component comprises at least a mirror.*

This difference solves the **objective problem** of providing a multi-mirror-system comprising an imaging system which is arranged to produce an arc-shaped image field from an object field.

None of the available **prior art** documents discloses this difference. D1 discloses (column 2, line 18 - column 3, line 3; column 3, line 57 - column 4, line 23; figures 1-6, 9) a uv (as opposed to vuv or euv) illumination system in which an arc-shaped image field is produced by means of an arcuate aperture and  $45^\circ$  incidence mirrors.

Therefore, claim 16 appears to be novel and inventive in the sense of Article 33 PCT. The same applies to apparatus **claims 17-26, 29**, because they depend on claim 1, and to apparatus **claims 30, 31**, insofar as they depend on claim 1.

The argument in favour of claim 16 applies *mutatis mutandis* to independent method **claim 32** insofar as it corresponds to independent apparatus claim 16.

**Item VII: Certain defects in the international application**

The description does not indicate the background art of D1-D3 according to Rule 5.1(a)(ii) PCT.

**Item VIII: Certain observations on the international application**

The claims are not clear in the sense of Article 6 PCT for the following reasons:

Paragraph 1.6 of **claim 1** refers to "an incidence angle" instead of "incidence angles".

**Claim 3** specifies that "the incidence angle . . . is" instead of "the incidence angles . . . are".

The arc-shaped field in paragraph 16.3 of **claim 16** is not clearly defined and could even be interpreted as a mathematical abstraction. Item V of this examination report is based on the definition of the arc-shaped field given in paragraph 16.4 of claim 16 and assumes that the non-limiting definition given in paragraph 16.3 has been deleted.

Paragraph 16.4 of claim 16 specifies an "image plant" instead of an "image plane".

**Claim 19** refers to "*said* grazing-incidence mirror"; but there is no prior reference to a *grazing-incidence* mirror.

**Claim 32** is not clear because there is no comma after the word "chips", and because the claim refers to "claims 30 to 31" instead of "one of claims 30 to 31".

## Patent Claims

1. Multi-mirror-system for an illumination system with wavelengths  $\leq$  193 nm
- 5 comprising an imaging system, wherein said imaging system comprises least a first mirror (5) and a second mirror (7)
- 1.1 an object plane (3)
- 1.2 an image plane (9), wherein the imaging system forms an image of the object
- 10 1.3 an arc-shaped field in said image plane (9), whereby the radial direction in the middle the arc-shaped field defines a scanning direction
- 1.4 at least said first mirror (5) and said second mirror (7) of said imaging system are arranged in the optical path of the imaging
- 15 system in such a position and having such a shape, that the edge sharpness of the arc-shaped field in the image plane is smaller than 5 mm in scanning direction, whereby the edge sharpness is defined as the difference of the greatest value and the smallest value in scanning direction of points of an spot diagramm in the image plane
- 20 1.5 the rays travelling from the object plane (3) to the image plane (9) in the imaging system are impinging the first (5) and the second mirror (7) defining a first and a second used area on the mirrors, characterized in that
- 25 1.6 the rays are impinging the first (5) and the second mirror (7) in the used area with an incidence angle relative to the surface normal of the mirror  $\leq 30^\circ$  or  $\geq 60^\circ$ .
2. Multi-mirror-system according to claim 1,
- 30 characterized in that the edge sharpness of the arc-shaped-field in the image plan is smaller than 2 mm, preferably 1 mm.

3. Multi-mirror-system according to claim 1 or 2,  
characterized in that the incidence angle relative to the surface  
normal of the mirror is  $\leq 20^\circ$  or  $\geq 70^\circ$ .
- 5 4. Multi-mirror-system according to one of the claims 1 to 3,  
characterized in that at least said first mirror (5) and said second  
mirror (7) of said imaging system are arranged in the optical path of  
the imaging system in such a position and having such a shape, that  
the edge sharpness of the arc-shaped field in the image plane is  
10 smaller than 5 mm, preferably 2 mm, most preferably 1 mm in the  
direction perpendicular to the scanning direction, whereby the edge  
sharpness is defined as the difference of the greatest value and the  
smallest value perpendicular to the scanning direction of points of an  
spot diagram in the image plane for an edge field point of the arc-  
15 shaped-field
5. Multi-mirror-system according to one of the claims 1 to 4,  
characterized in that  
the object in the object plane (3) is an arc-shaped field.
- 20 6. Multi-mirror-system according to one of the claims 1 to 5,  
characterized in that,  
the magnification ratio of the field imaged by the imaging system is  
unequal to 1.
- 25 7. Multi-mirror-system according to one of the claims 1 to 6,  
characterized in that,  
the imaging system is a non centred system.
- 30 8. Multi-mirror-system according to one of the claims 1 to 7,  
characterized in that,

a field stop is located in or close to the object plane (3).

- 5           9.     Multi-mirror-system according to one of the claims 1 to 8,  
characterized in that,  
the imaging system comprises an exit pupil (10) and an aperture  
stop is located on or close to the plane (42) conjugate to the exit  
pupil (10).
- 10          10.    Multi-mirror-system according to one of the claims 1 to 9,  
characterized in that,  
the imaging system comprises an exit pupil (10) and said first mirror  
is positioned close to the plane (42) conjugate to the exit pupil (10).
- 15          11.    Multi-mirror-system according to one of the claims 1 to 10,  
characterized in that,  
said first and/or the second mirror is an aspheric mirror.
- 20          12.    Multi-mirror-system according to one of the claims 1 to 11,  
characterized in that,  
the first mirror (5) is a concave mirror having a nearly hyperbolic  
form or a nearly elliptic form and is defining a first axis of rotation  
(50).
- 25          13.    Multi-mirror-system according to one of the claims 1 to 12,  
characterized in that,  
the second mirror (7) is a concave mirror having a nearly hyperbolic  
form or a nearly elliptic form and is defining a second axis of rotation  
(52).
- 30          14.    Multi-mirror-system according to one of the claims 12 to 13,  
characterized in that,

the first (5) and the second mirror (7) is comprising a used area in which the rays travelling through the imaging system are impinging the first and the second mirror; the used area is arranged off-axis in respect to the first and second axis of rotation.

5

15. Multi-mirror-system according to claim 12 to 14, characterized in that,

the first axis of rotation (50) and the second axis of rotation (52) subtend an angle  $\gamma$  and

10

the first mirror and the second mirror are defining a first magnification for the chief ray travelling through the centre of the field and the centre of the exit pupil, a second magnification for the upper COMA ray travelling through the centre of the field and the upper edge of the exit pupil and a third magnification for the lower

15

COMA ray travelling through the centre of the field and the lower edge of the exit pupil, whereby the angle  $\gamma$  between the first (50) and the second (52) axis of rotation is chosen such that the first, the second and the third magnification is nearly identical.

20

16. Multi-mirror-system for an illumination system for lithography with wavelengths  $\leq 193$  nm

comprising an imaging system, wherein said imaging system comprises

16.1. an object plane (3)

25

16.2 an image plane (9), wherein the imaging system forms an image of the object

16.3 an arc-shaped field in said image plane (9),

16.4 characterized in that said imaging system comprises at least a normal incidence mirror (5, 7) and a field forming optical component for producing an arc-shaped field in said image plant (9) wh reby

30

16.5 said field forming component comprises at least a mirror.

17. Multi-mirror-system according to claim 16,

characterized in that

5 the object in the object plane is an arbitrary field.

18. Multi-mirror-system according to one of the claim 17,

characterized in that,

10 the field in the object plane is a rectangular field and the rectangular field is formed into an arc-shaped field in the image plane by the field forming optical component.

19. Multi-mirror-system according to one of the claims 16 to 18,

characterized in that,

15 said grazing incidence mirror has negative optical power.

20. Multi-mirror-system according to one of the claims 16 to 18,

characterized in that,

20 said field forming component comprises a first grazing incidence mirror with positive optical power and a second grazing incidence mirror for rotating the field.

21. Multi-mirror-system according to one of the claims 16 to 20,

characterized in that,

25 said imaging system comprises two normal incidence mirrors (5, 7) and one grazing incidence mirror (306) as field forming component.

22. Multi-mirror-system according to one of the claim 16 to 21,

characterized in that,

30 the multi-mirror-system comprises a field stop located in the object plan .

23. Multi-mirror-system according to one of the claims 16 to 22,  
characterized in that,  
the magnification ratio of the field imaged by the imaging system is  
unequal to 1.
- 5
24. Multi-mirror-system according to one of the claims 16 to 23,  
characterized in that,  
said at least normal incidence mirror(s) and/or said first grazing  
incidence mirror and/or said second grazing incidence mirror is an  
10 (are) aspheric mirror(s).
25. Multi-mirror-system according to one of the claims 16 to 24,  
characterized in that,  
said field forming component is positioned close to the image plane.
- 15
26. Multi-mirror-system according to one of the claims 16 to 25,  
characterized in that,  
said at least normal incidence mirror(s) and/or the first grazing  
incidence mirror and/or the second grazing incidence mirror is (are)  
20 comprising a used area in which the rays travelling through the  
imaging system is impinging the at least normal incidence mirror(s)  
and/or the first grazing incidence mirror and/or the second grazing  
incidence mirror and said used area is arranged off-axis with regard  
to the first axis.
- 25
27. Illumination system, especially for lithography with wavelengths  $\leq$   
193 nm  
comprising
- 27.1 a light source
- 30 27.2 a multi-mirror system comprising an imaging system, whereby th  
imaging system comprises an object plane



- 27.3 an optical component for forming an arc-shaped field in the object plane of the multi-mirror-system characterized in that
- 5 27.4 the multi-mirror-system is a system according to one of the claims 1 to 15 for imaging the field in the object plane into the image plane of the imaging system.
- 10 28. Multi-mirror-system according to claim 27, characterized in that, the illumination system comprises at least one mirror or one lens which is or which are comprising raster elements for forming secondary light sources.
- 15 29. Illumination system, especially for lithography with wave lengths  $\leq$  193 nm comprising
- 29.1 a light source
- 29.2 a multi-mirror-system comprising an imaging system, whereby the imaging system comprises an object plane
- 20 29.3 an arbitrary field in said object plane
- 29.4 at least one mirror or lens device comprising at least one mirror or one lens, which is or are comprising raster elements for forming secondary light sources characterized in that
- 25 29.5 the illumination system comprises a multi-mirror-system according to one of the claims 16 to 26.
30. EUV-projection exposure unit for microlithography comprising
- 30.1 an illumination system according to at least one of the claims 27 to 29 with an exit pupil
- 30

- 30.2 a mask on a carrier system, said mask being positioned in the image plane of the imaging system
- 30.3 a projection objective with an entrance pupil, said entrance pupil being in the same plane as the exit pupil of the illumination system
- 5 30.4 a light sensitive object on a carrier system.
31. EUV-projection exposure unit according to claim 30, designed as a scanning system.
- 10 32. Process for producing microelectronic devices, especially semiconductor chips with a EUV-projection exposure unit according to claims 30 to 31.

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

**PCT/EP 00 / 07 2 5 8**

International Application No.

**28 JUL 2000**

**(28.07.00)**

International Filing Date

**EUROPEAN PATENT OFFICE**  
**PCT INTERNATIONAL APPLICATION**  
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) **P 15349WO**

**Box No. I TITLE OF INVENTION**

**Multi Mirror System for an Illumination System**

**Box No. II APPLICANT**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

**Carl Zeiss**

**89518 Heidenheim**  
**DE**

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:  
**DE**

State (that is, country) of residence:  
**DE**

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☒ the States indicated in the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

**Carl-Zeiss-Stiftung trading as Carl Zeiss**

**89518 Heidenheim**  
**DE**

This person is:

☒ applicant only

☐ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
**DE**

State (that is, country) of residence:  
**DE**

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☒ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

**Dr. Weitzel & Partner**  
**Friedenstraße 10**

**89522 Heidenheim**  
**DE**

Telephone No.

**07321/93520**

Facsimile No.

**07321/935249**

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
<i>If none of the following sub-boxes is used, this sheet should not be included in the request.</i>	
<p>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</p> <p>ANTONI, Martin Brunnenstraße 19  73430 Aalen DE</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)</p>
State (that is, country) of nationality: DE	State (that is, country) of residence: DE
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</p> <p>ESCUDERO-SANZ, Isabel Sytwinde 15  2631 GP Nootdorp NL</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)</p>
State (that is, country) of nationality: ES	State (that is, country) of residence: NL
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</p> <p>SINGER, Wolfgang Egerlandstraße 45  73431 Aalen DE</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)</p>
State (that is, country) of nationality: DE	State (that is, country) of residence: DE
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</p> <p>WANGLER, Johannes An der Reute 15  89551 Königsbronn DE</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)</p>
State (that is, country) of nationality: DE	State (that is, country) of residence: DE
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p><input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.</p>	

## Continuation of Box N . III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

SCHULTZ, Jörg  
Bohlstraße 29  
  
73430 Aalen  
DE

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
DE

State (that is, country) of residence:  
DE

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on another continuation sheet.

**Box N .V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☐ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |   |   |
|---|---|
| <input type="checkbox"/> AL Albania .....                               | <input type="checkbox"/> LS Lesotho .....                                   |
| <input type="checkbox"/> AM Armenia .....                               | <input type="checkbox"/> LT Lithuania .....                                 |
| <input type="checkbox"/> AT Austria .....                               | <input type="checkbox"/> LU Luxembourg .....                                |
| <input type="checkbox"/> AU Australia .....                             | <input type="checkbox"/> LV Latvia .....                                    |
| <input type="checkbox"/> AZ Azerbaijan .....                            | <input type="checkbox"/> MD Republic of Moldova .....                       |
| <input type="checkbox"/> BA Bosnia and Herzegovina .....                | <input type="checkbox"/> MG Madagascar .....                                |
| <input type="checkbox"/> BB Barbados .....                              | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia ..... |
| <input type="checkbox"/> BG Bulgaria .....                              | <input type="checkbox"/> MN Mongolia .....                                  |
| <input type="checkbox"/> BR Brazil .....                                | <input type="checkbox"/> MW Malawi .....                                    |
| <input type="checkbox"/> BY Belarus .....                               | <input type="checkbox"/> MX Mexico .....                                    |
| <input type="checkbox"/> CA Canada .....                                | <input type="checkbox"/> NO Norway .....                                    |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein .....  | <input type="checkbox"/> NZ New Zealand .....                               |
| <input type="checkbox"/> CN China .....                                 | <input type="checkbox"/> PL Poland .....                                    |
| <input type="checkbox"/> CU Cuba .....                                  | <input type="checkbox"/> PT Portugal .....                                  |
| <input type="checkbox"/> CZ Czech Republic .....                        | <input type="checkbox"/> RO Romania .....                                   |
| <input type="checkbox"/> DE Germany .....                               | <input type="checkbox"/> RU Russian Federation .....                        |
| <input type="checkbox"/> DK Denmark .....                               | <input type="checkbox"/> SD Sudan .....                                     |
| <input type="checkbox"/> EE Estonia .....                               | <input type="checkbox"/> SE Sweden .....                                    |
| <input type="checkbox"/> ES Spain .....                                 | <input type="checkbox"/> SG Singapore .....                                 |
| <input type="checkbox"/> FI Finland .....                               | <input type="checkbox"/> SI Slovenia .....                                  |
| <input type="checkbox"/> GB United Kingdom .....                        | <input type="checkbox"/> SK Slovakia .....                                  |
| <input type="checkbox"/> GD Grenada .....                               | <input type="checkbox"/> SL Sierra Leone .....                              |
| <input type="checkbox"/> GE Georgia .....                               | <input type="checkbox"/> TJ Tajikistan .....                                |
| <input type="checkbox"/> GH Ghana .....                                 | <input type="checkbox"/> TM Turkmenistan .....                              |
| <input type="checkbox"/> GM Gambia .....                                | <input type="checkbox"/> TR Turkey .....                                    |
| <input type="checkbox"/> HR Croatia .....                               | <input type="checkbox"/> TT Trinidad and Tobago .....                       |
| <input type="checkbox"/> HU Hungary .....                               | <input type="checkbox"/> UA Ukraine .....                                   |
| <input type="checkbox"/> ID Indonesia .....                             | <input type="checkbox"/> UG Uganda .....                                    |
| <input type="checkbox"/> IL Israel .....                                | <input checked="" type="checkbox"/> US United States of America .....       |
| <input type="checkbox"/> IN India .....                                 | <input type="checkbox"/> UZ Uzbekistan .....                                |
| <input type="checkbox"/> IS Iceland .....                               | <input type="checkbox"/> VN Viet Nam .....                                  |
| <input checked="" type="checkbox"/> JP Japan .....                      | <input type="checkbox"/> YU Yugoslavia .....                                |
| <input type="checkbox"/> KE Kenya .....                                 | <input type="checkbox"/> ZW Zimbabwe .....                                  |
| <input type="checkbox"/> KG Kyrgyzstan .....                            |   |
| <input type="checkbox"/> KP Democratic People's Republic of Korea ..... |   |
| <input checked="" type="checkbox"/> KR Republic of Korea .....          |   |
| <input type="checkbox"/> KZ Kazakhstan .....                            |   |
| <input type="checkbox"/> LC Saint Lucia .....                           |   |
| <input type="checkbox"/> LK Sri Lanka .....                             |   |
| <input type="checkbox"/> LR Liberia .....                               |   |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
- ☐ .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

**Supplemental Box** *If the Supplemental Box is not used, this sheet should not be included in the request.*

1. If, in any of the Boxes, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ..." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:

- (i) if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
- (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
- (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
- (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
- (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
- (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
- (vii) if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed.

2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

Continuation of Box No. II and III:

Applicant: Carl-Zeiss-Stiftung trading as Carl Zeiss  
89518 Heidenheim, DE

only for JP, KR, GB (EP), IE (EP)

Applicant: Carl Zeiss, 89518 Heidenheim, DE

only for EP without GB, IE

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1) 30.07.1999 (30. Juli 1999)	199 35 568.1	DE		
item (2) 09.09.1999 (09. Sept. 1999)	299 15 847.0	DE		
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

### Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA /

Request to use results of earlier search: reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)

Number

Country (or regional Office)

### Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 6  
description (excluding sequence listing part) : 41  
claims : 8  
abstract : 1  
drawings : 26  
sequence listing part of description : \_\_\_\_\_

Total number of sheets : 82

This international application is accompanied by the item(s) marked below:

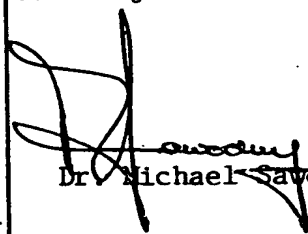
1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☒ copy of general power of attorney; reference number, if any: 40348, 40347
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s): 1, 2
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other (specify):

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: english

### Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request)

  
Dr. Michael Sawodny

An executed Power of Attorney signed by the applicants and/or inventors M. Antoni, J. Escudero-Sanz, W. Singer, J. Wangler and J. Schultz will follow.

For receiving Office use only		2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:	28 JUL 2000 (28.07.00)	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA /	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	
Form PCT/RO/101 (last sheet) (July 1998; reprint January 1999)	
See Notes to the request form	



## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P 15349W0</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 00/ 07258</b>	International filing date (day/month/year) <b>28/07/2000</b>	(Earliest) Priority Date (day/month/year) <b>30/07/1999</b>
Applicant <b>CARL ZEISS</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**

the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**

the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figure No.**

as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

**1**

None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/07258

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G03F7/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G03F G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 572 659 A (OMATA TAKASHI) 25 February 1986 (1986-02-25) column 1, line 12 - line 48 column 2, line 18 - column 3, line 3 column 3, line 57 - column 4, line 23 figures 1-6,9	1-3,27
A	---	30,32
X	US 5 677 939 A (OSHINO TETSUYA) 14 October 1997 (1997-10-14) column 22, line 10 - column 26, line 29 figures 5,6,11-14,21 ---	15,29-32
	--- -/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

18 December 2000

Date of mailing of the international search report

02.02.01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Heryet, C

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/07258

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 581 605 A (TANITSU OSAMU ET AL) 3 December 1996 (1996-12-03) column 1, line 11 -column 2, line 22 column 3, line 65 -column 6, line 15 column 17, line 35 -column 18, line 43 figure 28 -----	15,29-32

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP 00/07258

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 00/07258

## Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The invention relates to a multi-mirror-system for an illumination system, especially for lithography with wavelenghts  $\leq 193$  nm comprising an imaging system, wherein said imaging system comprises least a first mirror (5) and a second mirror (7);  
an object plane (3);  
an image plane (9), wherein the imaging system forms an image of the object;  
and an arc-shaped field in said image plane (9), whereby the radial direction H in the middle of the arc-shaped field defines a scanning direction.  
The multi-mirror-system is characterized in that at least said first mirror (5) and said second mirror (7) of said imaging system are arranged in the optical path of the imaging system such a position and having such a shape, that the edge sharpness of the arc-shaped field in the image plane is smaller than 5 mm, preferably 2 mm, most preferably 1 mm in scanning direction.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-14,27,28; 30-32 (part)

Multi-mirror system arranged to form an arc-shaped image field with a predetermined edge sharpness.

2. Claims: 15-26,29; 30-32 (part)

Multi-mirror system arranged to form an arc-shaped image field and comprising a normal incidence mirror and a field forming component.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/07258

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 4572659	A	25-02-1986	JP 59064830	A	12-04-1984
US 5677939	A	14-10-1997	JP 7235470	A	05-09-1995
			JP 7235471	A	05-09-1995
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